

Pathway To Engineering High School Course Descriptions

PLTW's **Pathway To Engineering (PTE)** curriculum is designed as a four-year high school sequence. Foundation courses (Introduction to Engineering Design, Principles of Engineering, and Digital Electronics) are supplemented by a number of electives to create eight rigorous, relevant, reality-based courses:

Foundation Courses

- **Introduction to Engineering Design (IED)**
 - Designed for 9th or 10th grade students, the major focus of the IED course is to expose students to the design process, research and analysis, teamwork, communication methods, global and human impacts, engineering standards and technical documentation. Students use 3D solid modeling design software to help them design solutions to solve proposed problems and learn how to document their work and communicate solutions to peers and members of the professional community.
- **Principles of Engineering (POE)**
 - This survey course of engineering exposes students to major concepts they'll encounter in a postsecondary engineering course of study. Students employ engineering and scientific concepts in the solution of engineering design problems. They develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges, documenting their work and communicating solutions to peers and members of the professional community.
- **Digital Electronics (DE)**
 - Digital electronics is the foundation of all modern electronic devices such as cellular phones, MP3 players, laptop computers, digital cameras and high-definition televisions. The major focus of the DE course is to expose students to the process of combinational and sequential logic design, teamwork, communication methods, engineering standards and technical documentation. This course is designed for 10th or 11th grade students.

Specialization Courses

- **Aerospace Engineering (AE)**
 - Aerospace Engineering engages students in engineering design problems related to aerospace information systems, astronautics, rocketry, propulsion, the physics of space science, space life sciences, the biology of space science, principles of aeronautics, structures and materials, and systems engineering. Using 3-D design software, students work in teams utilizing hands-on activities, projects and problems and are exposed to various situations encountered by aerospace engineers. This course is designed for 11th or 12th grade students.
- **Biotechnical Engineering (BE)**
 - The major focus of this course is to expose students to the diverse fields of biotechnology including biomedical engineering, molecular genetics, bioprocess

engineering, and agricultural and environmental engineering. Lessons engage students in engineering design problems related to biomechanics, cardiovascular engineering, genetic engineering, agricultural biotechnology, tissue engineering, biomedical devices, forensics and bioethics. Students, usually 11th and 12th grade level, apply biological and engineering concepts to design materials and processes that directly measure, repair, improve and extend living systems.

- **Civil Engineering and Architecture (CEA)**
 - Students apply what they learn about various aspects of civil engineering and architecture to the design and development of a property. Working in teams, students explore hands-on activities and projects to learn the characteristics of civil engineering and architecture. In addition, students use 3D design software to help them design solutions to solve major course projects. Students learn about documenting their project, solving problems and communicating their solutions to their peers and members of the professional community of civil engineering and architecture. This course is designed for 11th or 12th grade students.
- **Computer Integrated Manufacturing (CIM)**
 - Students answer the questions: How are things made? What processes go into creating products? Is the process for making a water bottle the same as it is for a musical instrument? How do assembly lines work? How has automation changed the face of manufacturing? As students find the answers to these questions, they learn about the history of manufacturing, a sampling of manufacturing processes, robotics and automation. The course is built around several key concepts: computer modeling, Computer Numeric Control (CNC) equipment, Computer Aided Manufacturing (CAM) software, robotics and flexible manufacturing systems. This course is designed for 10th, 11th or 12th grade students.

Capstone Course

- **Engineering Design and Development (EDD)**
 - This is an engineering research course in which students will work in teams to research, design, test and construct a solution to an open-ended engineering problem. The product development life cycle and a design process are used to guide and help the team to reach a solution to the problem. The team presents and defends their solution to a panel of outside reviewers at the conclusion of the course. The EDD course allows students to apply all the skills and knowledge learned in previous Project Lead The Way courses. The use of 3D design software helps students design solutions to the problem their team has chosen. This course also engages students in time management and teamwork skills, a valuable set for students in the future. This course is designed for 12th grade students.